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(71) Applicant(s)

Tunturipyora OY

(Incorporated in Finland)

Untamokatu 2, FIN-20520 Turku, Finland

(72) Inventor(s)

Randolf F Miller

(74) Agent and/or Address for Service

Gill Jennings & Every  
Broadgate House, 7 Eldon Street, LONDON,  
EC2M 7LH, United Kingdom

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## (54) Dual-action exercise apparatus

(57) Dual-action exercise apparatus such as cross country ski exercisers and dual-action climbers, treadmills and the like include longitudinally extensible and shortenable pump poles P designed for hand and arm action. The pump poles P are fixedly attached to the apparatus base 28 rearwardly thereof via a coil spring 62 allowing for limited relative movement and manipulated concurrently with or independently of reciprocating leg action. Each pump pole P has inner and outer telescoping tubes 54, 56 and an air pressurizable chamber (70 Fig. 5) providing greater resistance to pole shortening movement than occurs during pole lengthening movement. The said chamber has a piston (66 Fig. 5) sealed by a U-cup seal (68 Fig. 5) mounted on tube 54 moving inside tube 56, which has an adjustable valve (72, 74 Fig. 5) to release the pressurised air.

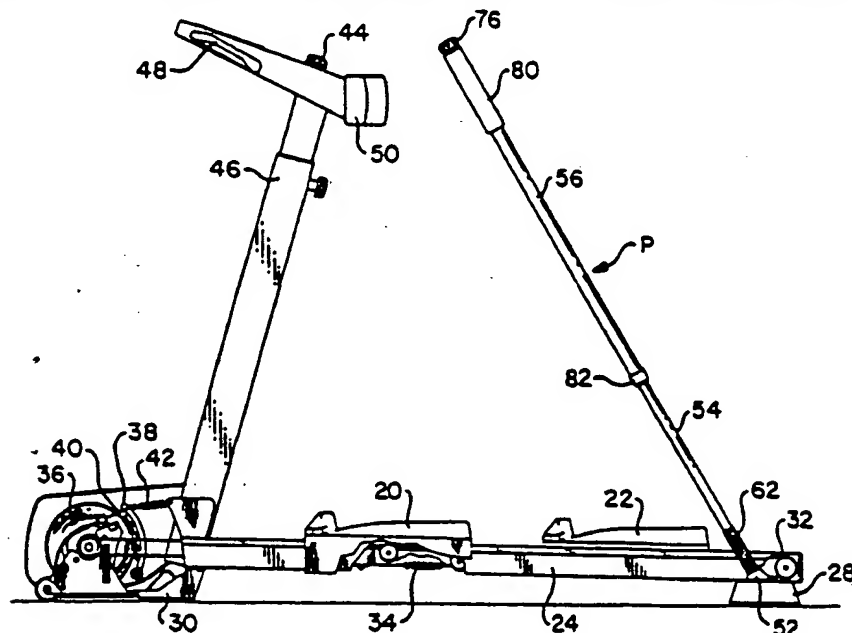


FIG. 1

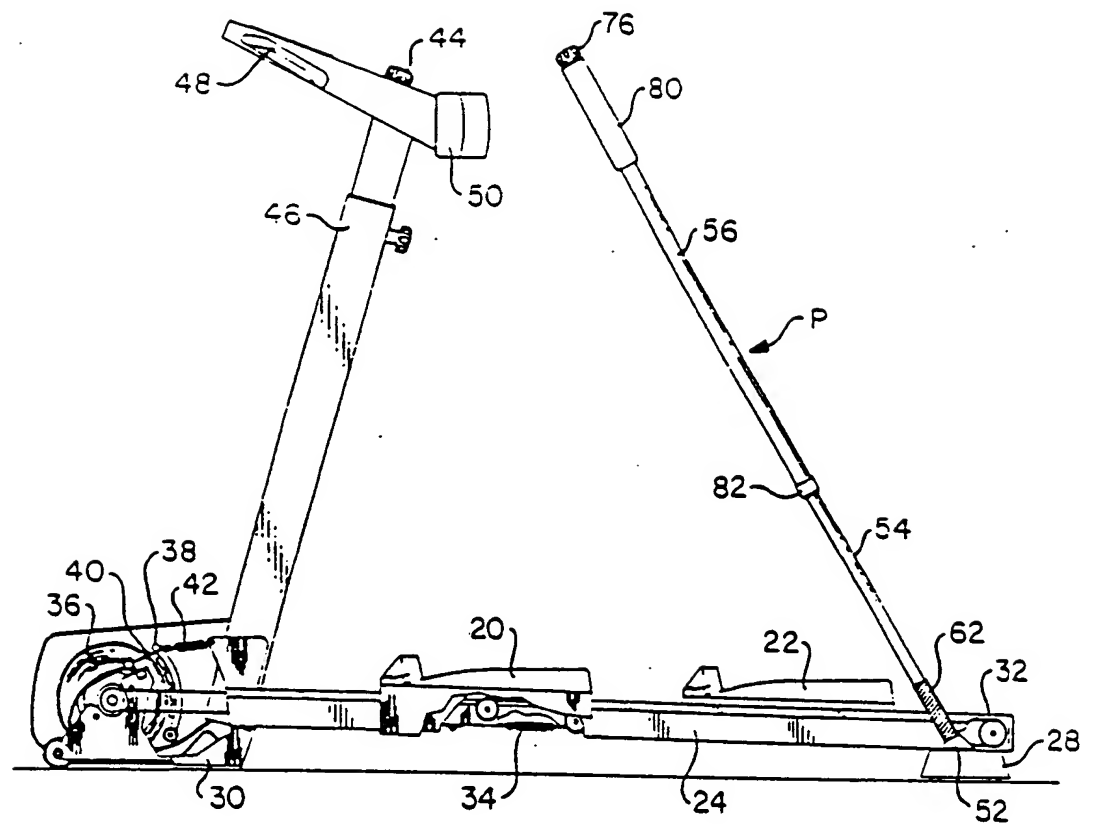


FIG. 1

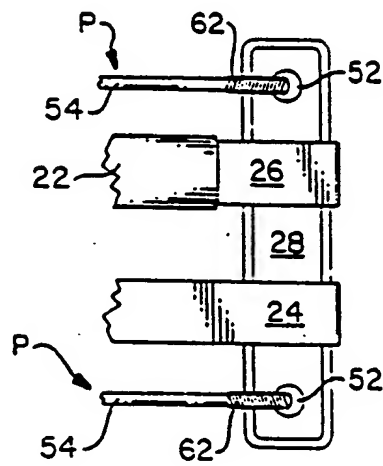


FIG. 2

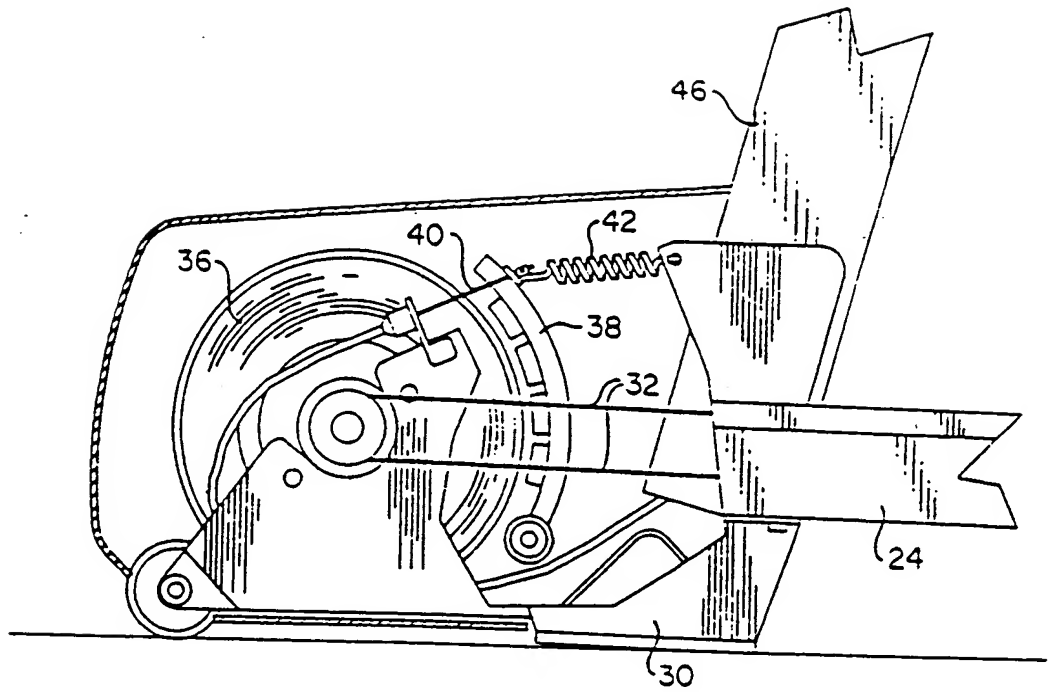


FIG. 3

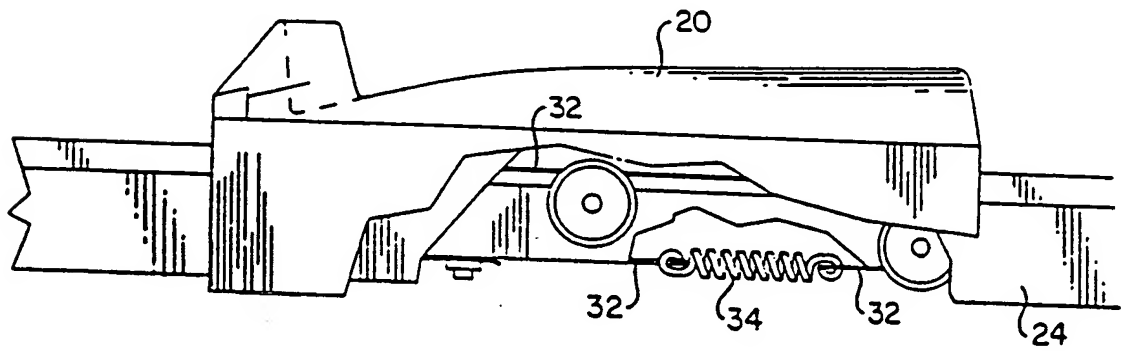
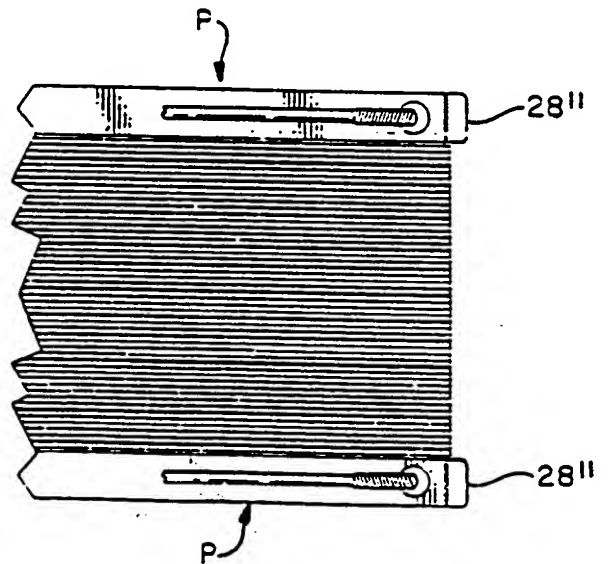
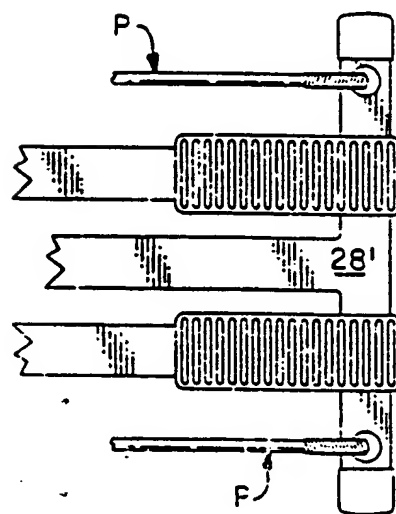
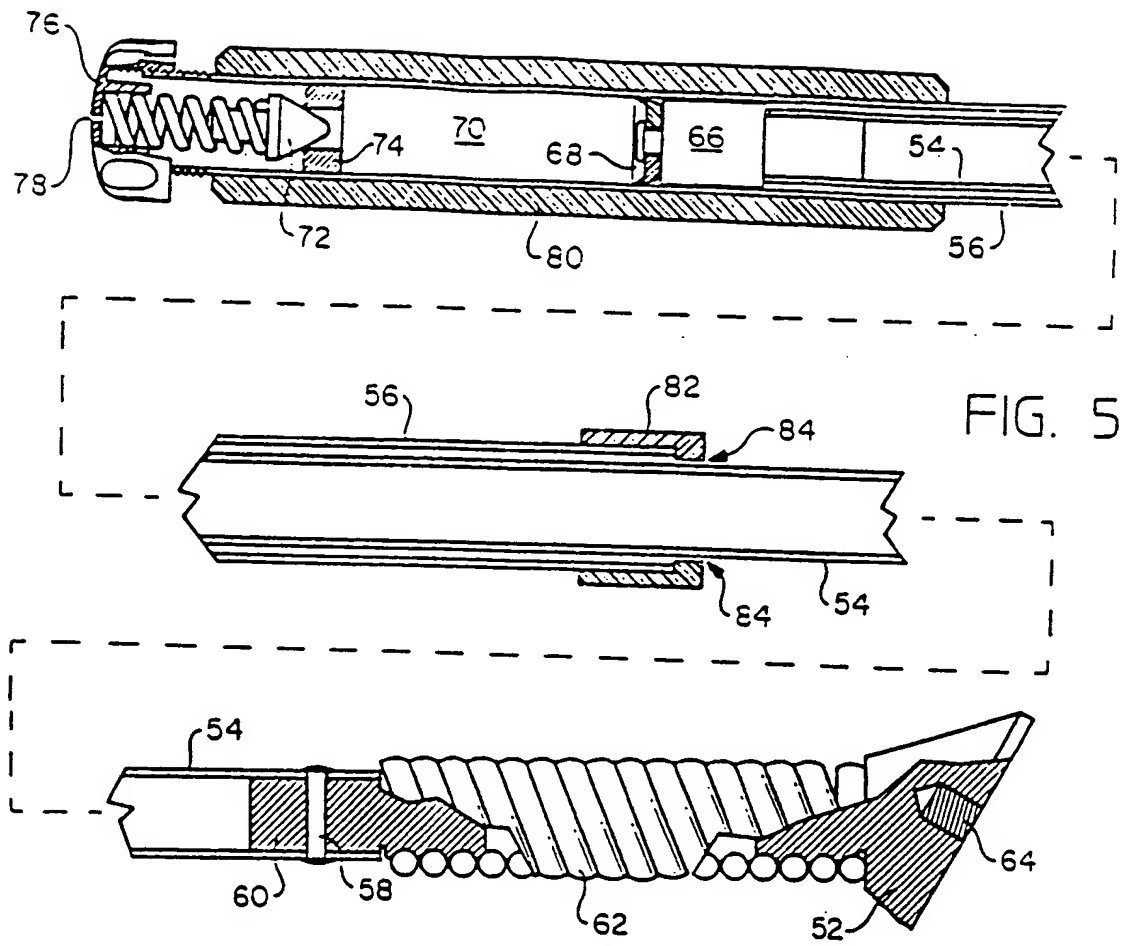


FIG. 4



## DUAL-ACTION EXERCISE APPARATUS

The present invention relates to dual-action exercise  
5 apparatus and more particularly such apparatus involving  
means enabling reciprocating movement of both hands and  
feet, such as in cross country ski exercisers and  
dual-action treadmills, climbers and the like.

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Cross country ski exercisers are typical of exercise  
apparatus with a so-called dual action, i.e. with both leg  
and arm movement to simulate movement over the ground such  
as in cross country skiing. Typically, in such exercise  
15 apparatus, pole movement by hand actuation typically  
involves the poles being pivotally movable relative to the  
base structure, as in US-A- 4,743,015 (at 22), US-A-  
5,000,442 (at levers 50, 52), and US-A- 5,108,093 (at  
24, 26). Ski simulating exercisers are also known which  
20 involve reciprocated slide members for both the feet and ski  
poles, such as disclosed in US-A- 4,679,786 (at 65), and  
US-A-4,960,276 (at 38).

In these known dual action exercise apparatus the  
poles or handles or levers provided for hand and arm

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movement are characteristically of fixed length with the movement being of a pivotal nature or with the lower end of the pole or the like moved horizontally relative to the base structure in a reciprocating manner. In either of these arrangements the pivotal or reciprocating movement of the poles or the like is inherently somewhat artificial in terms of not accurately simulating the hand and arm polling action of a person actually moving over ground.

In accordance with the present invention, dual-action exercise apparatus comprises a fixed base structure and means on said base structure whereby a user can exercise by use of means enabling reciprocating movement of the legs and feet relative to the base structure and also by use of means enabling reciprocating movement in the arms and hands relative to the base structure, wherein the means enabling reciprocating movement of the arms and hands comprises hand engageable, longitudinally extensible and shortenable pole means affixed at the lower ends thereof rearwardly on said base structure and extending upwardly and forwardly to hand grips at the upper ends thereof, each such pole means including telescoping lower and upper parts enabling the user of the exercise device to reciprocally change the length of the poles to simulate progressive polling movement of the arms and hands relative to said base structure.

The present invention provides dual-action exercise apparatus pole means enabling hand and arm manipulation which more accurately simulates the polling action as it would occur with the user actually moving over ground.

The pole means is simple and durable in nature, is fixed at the lower end thereof to stationary base structure, and is reciprocally extensible and shortenable responsive to arm and hand action.

The lengthening and shortening of the poles relative to the base of the apparatus is characterised by a pumping action simulating the polling movement of a user when actually moving over ground, such pumping action being in

the nature of the pump handle movement of a conventional bicycle pump, i.e. with a lengthening or up stroke involving relatively low resistance to movement and with a shortening or down stroke involving relatively greater resistance to movement, with the latter resistance to movement being selectively variable to meet the particular exercise need of the user.

Preferably, the mounting arrangement for the pole means is of a fixed nature with respect to the base of the apparatus yet incorporates a resilient interconnection between the fixed base and the pole, such as a coil spring, to enable limited pivotal movement of the pole while being hand manipulated with a pumping action.

Some examples of apparatus according to the present invention will now be described with reference to the accompanying drawings, in which:-

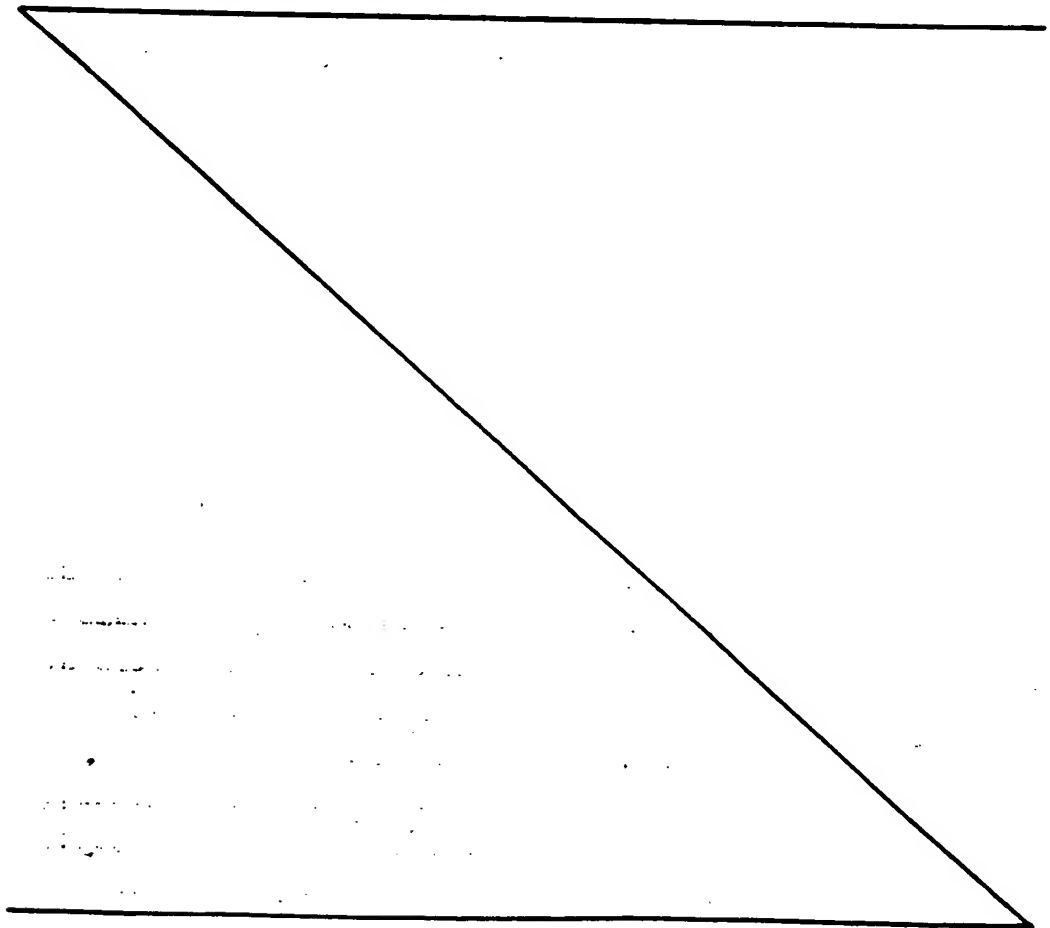


FIG. 1 is a side elevational view of a dual-action ski exerciser embodying a preferred form of ski pole simulating poles according to the present invention;

5        FIG. 2 is a detail plan view of the rear portion of the base and the lower portions of the poles of the ski exerciser shown in FIG. 1;

FIG. 3 is a detail side view on an enlarged scale with certain parts broken away of the forward portion of the  
10 . ski exerciser shown in FIG. 1;

FIG. 4 is a detailed view on an enlarged scale with certain parts broken away for clarity of illustration of a foot support and adjacent area of the ski exerciser shown in FIG. 1;

15        FIG. 5 is an enlarged and primarily cross-sectional view of one of the ski pole simulating poles of the ski exerciser shown in FIG. 1;

FIG. 6 is a detail plan view of the rear portion of the base and the lower portions of poles according to the  
20 invention attached rearwardly to the base of an otherwise conventional stairclimber type exercise apparatus; and

FIG. 7 is a detail plan view of the rear portion of the base and the lower portions of the poles according to the present invention attached to the base of an otherwise  
25 conventional treadmill type exercise apparatus.



The dual-action ski exerciser shown in FIGS. 1-4 is of generally conventional construction and mode of operation except for its ski pole simulating poles. Thus, foot engaged supports 20, 22 are arranged in a known manner to reciprocate on tracks 24, 26 which are supported by base members 28, 30, in a manner similar to the foot engaged pads and parallel rails on base members in the apparatus shown in

U.S. -A- 4,743,015. Also, in a manner conventional per se, the foot engaged pedals 20, 22 are reciprocally linked together through belting 32 maintained under tension by spring means 34, with a resistance loading on the cable means which is magnetically selectively variable by means of flywheel 36 on which a variable braking effect is exerted by pivotally movable magnets 38, such movement being through lengthwise movement of belt 40 which is maintained taut by tension spring 42, the movement of cable 40 being responsive to rotation of knob 44 on post 46, all in a manner conventional per se such as shown in U.S. -A- 5,031,901. Post 46 carries fixed handholds as at 48 and a waist engageable support 50 for use by the user as desired.

In accordance with the invention, the skiing simulated exercise apparatus shown in FIGS. 1 - 4 includes a pair of ski pole simulating pole members, the left hand one

of which is indicated generally in FIG. 1 at P, and the lower portions of which are shown at P in FIG. 2, which pole members are fixedly mounted at the lower end fixtures 52 thereof on rear base member 28.

5           The construction of each pole member P, as shown in detail in FIG. 5, involves an inner tube 54 and an outer tube 56 in telescoped relation, the inner tube 54 being connected at its lower end by pin 58 to a plug 60 threaded in its lower portion to rigidly engage the upper end of coil  
10   spring 52 which at its lower end is in turn threaded to attachment fixture 52 which is in turn attached by a bolt not shown engaging threads 54 in fixture 52. Inner tube 54 at its upper end comprises a piston 66 and a U-cup seal 68. Cooperating with the U-cup seal to form a pressurized air  
15   chamber 70 is spring-loaded valve 72 and valve seat 74. Rotatable knob 76 is in threaded engagement with the outer tube 56 at the top thereof and is provided with an air exhaust hole 78. In the upper portion of the outer tube 56, a hand grip 80 engageable by the user's hand, encircles the  
20   outer tube 56.

          The outer tube 56 is provided at its lower end with an end cap 82 which is configured to leave a cylindrical gap at 84 between it and the inner tube 54. As will be  
apparent, the construction provides for a telescoping  
25   movement between the outer tube 56 and inner tube 54 and an

air pumping action very similar to that of a conventional bicycle pump. Upon extension or elongation of the pole by upward movement of the hand grip 80 and outer tube 56, ambient air is drawn in through the gap 84 and through the space between the outer tube 56 and inner tube 54 and the space between piston 66 and outer tube 56 and past the U-cup seal 68 into the air pressure chamber 70, all with relatively low resistance. Then, upon downward, shortening movement of the outer tube 56 relative to the inner tube 54, the U-cup seal 68 by reason of the relatively high pressure incurred by the reduction of volume of the air pressure chamber 70 seals against the outer tube 56 and the pressure and consequent resistance to further movement increases in the air pressure chamber 70 until the pressure is sufficient to upset the valve 72 from its seat 74 and permit escape of some air past the valve seat 74 and out the exhaust opening 78. Then, upon renewed extension movement of the outer tube 56 relative to the inner tube 54 the valve 72 reseats and air is again brought into the pressure chamber 70 past the U-cup seal 68 in the same manner as during the first extension stroke.

As will be understood repeated telescopic movement of the upper portion of the pole by hand and arm action occurs in a generally rectilinear manner by reason of the pole being fixedly attached at its lower end to the base member

and it is this action with primary resistance occurring during the downward and pole shortening movement which simulates a polling action as it occurs during actual movement over ground. While the telescoping action is essentially rectilinear, slight variations in the position of the upper end of the pole and angularly relative to the base member can occur incident to the pumping action and in the embodiment of the invention shown are accommodated by a coil spring 62 which is rigidly interconnected with both the fixed fixture 52 and the lower end plug 60 of inner tube 54 but which can flex to a degree without bending or breakage of the pole tubes. Spring 62 is of sufficient rigidity to render the pole self-supporting when standing free such as shown in FIG. 1.

As will be recognized, the telescopable, pump action exercise pole of the present invention is readily adaptable to usages with exercise apparatus other than the ski simulating exerciser apparatus illustrated and discussed specifically above. Thus, by way of other examples, poles like poles P, which for simplicity can be termed simply pump poles, can be employed for hand and arm action and mounted rearwardly on the base of climbers, treadmills and the like which are intended to be operated in a stationary manner but which enable the user to simulate movement over or relative to the ground with a polling movement of the hands and arms

relative to the ground. Thus, for example, poles P are mountable on the rear portion of base member 28' of an otherwise conventional stairclimber as shown in FIG. 6, and rearwardly on the base 28'' of an otherwise conventional treadmill, as shown in FIG. 7.

Since each pole member P is independently actuatable by the user, it is also evident that poles can be purchased separately and are readily added to existing apparatus such as single-action climbers or treadmills to provide a dual-action mode of operation thereof, as desired.

## CLAIMS

1. Dual-action exercise apparatus comprising a fixed base structure and means on said base structure whereby a user  
5 can exercise by use of means enabling reciprocating movement of the legs and feet relative to the base structure and also by use of means enabling reciprocating movement in the arms and hands relative to the base structure, wherein the means enabling reciprocating  
10 movement of the arms and hands comprises hand engageable, longitudinally extensible and shortenable pole means affixed at the lower ends thereof rearwardly on said base structure and extending upwardly and forwardly to hand grips at the upper ends thereof, each such pole means  
15 including telescoping lower and upper parts enabling the user of the exercise device to reciprocally change the length of the poles to simulate progressive polling movement of the arms and hands relative to said base structure.
- 20 2. The exercise apparatus of claim 1, wherein the loading on each pole means is greater during shortening movement of the pole means than during lengthening thereof.
3. The exercise apparatus of claim 1 or claim 2, wherein each of said pole means comprises piston and cylinder  
25 components providing a pneumatic loading action during change in length of each pole means.
4. The exercise apparatus according to claim 3, further comprising means for varying the amount of said pneumatic loading.
- 30 5. Exercise apparatus according to any of the preceding claims, wherein the exercise apparatus comprises one of a cross country ski exercise apparatus, a dual-action treadmill and a dual-action climber.
- 35 6. Exercise apparatus according to any of claims 1 to 4, wherein the apparatus is configured to enable the user to simulate cross country skiing movements and comprises an elongate base structure, foot engaging supports

reciprocable forwardly and rearwardly of said base structure, and wherein the hand engaging pole means are affixed near the rearward end of said base structure and terminate in hand engageable grips above and at respective sides of said base structure.

5 7. Dual-action exercise apparatus substantially as hereinbefore described with reference to any of the examples shown in the accompanying drawings.

Search Examiner  
Karl Whitfield

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Date of completion of Search  
14 March 1994

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
1-7

**(ii) ONLINE DATABASE : WPI**

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<b>Y:</b>	Document indicating lack of inventive step if combined with one or more other documents of the same category.	<b>E:</b>	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
<b>A:</b>	Document indicating technological background and/or state of the art.	<b>&amp;:</b>	Member of the same patent family; corresponding document.

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